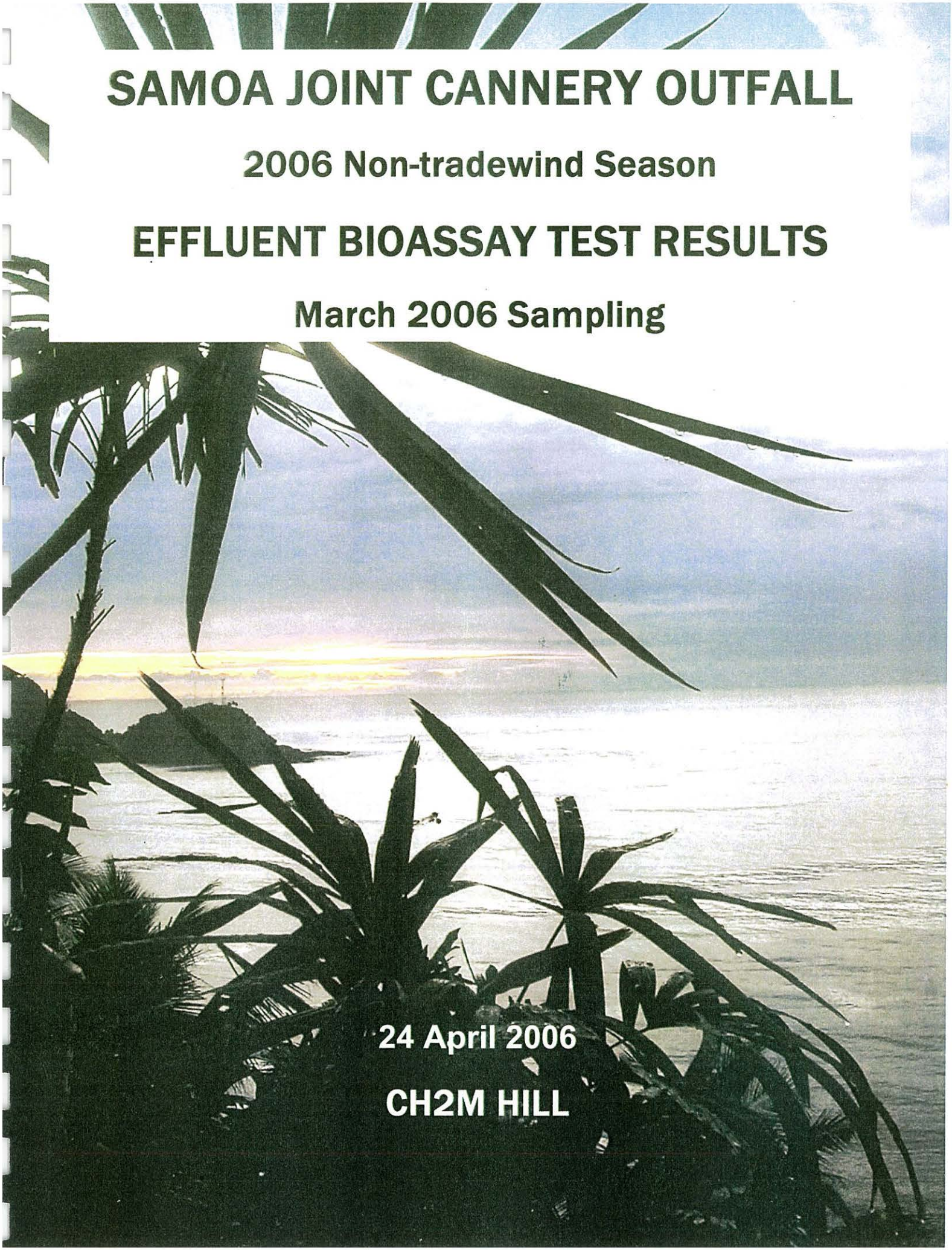
SAMOA JOINT CANNERY OUTFALL

2006 Non-tradewind Season

EFFLUENT BIOASSAY TEST RESULTS

March 2006 Sampling



24 April 2006

CH2M HILL

TECHNICAL MEMORANDUM

CH2MHILL

BIOASSAY TESTING – JOINT CANNERY OUTFALL EFFLUENT MARCH 2006 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)
COS Samoa Packing (NPDES Permit AS0000027)

Prepared By: Steve Costa
Karen Glatzel

Date: 24 April 2006

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

Purpose

This memorandum presents the results of the bioassay testing of the Joint Cannery Outfall effluent sample that was collected in March 2006. The testing is required by the NPDES Permits that became effective in January 2001. This is the eleventh required semi-annual test required by the current permits and the twenty-seventh test conducted since toxicity testing of the Joint Cannery Outfall effluent began in 1993[1].

Study Objectives

Section D.1 of the StarKist Samoa and COS Samoa Packing NPDES Permits requires that semiannual definitive acute bioassays (96-hour static bioassays) be conducted on the cannery effluent. The purpose of these tests is to determine whether, and at what effluent concentration, acute toxicity may be detected for the combined joint cannery effluent discharge into Pago Pago Harbor.

[1] Testing was not conducted during 1999. Extra tests using two organisms were conducted in March 1995 and February 1996.

Study Approach

The U.S. Environmental Protection Agency (USEPA) has conducted a number of reviews of the effluent sampling, analysis, and bioassay tests conducted in the past. All comments from (USEPA have been incorporated into the sampling and sample handling standard operating procedures (SOP) or have been incorporated into the procedures used by the laboratory doing the test. The comments, responses, and SOP have been documented in previous reports.

The NPDES permit conditions require that the bioassay tests be conducted with the white shrimp, *Penaeus vannami* (postlarvae). In the event *Penaeus vannami* is not available at the time of the tests, the permit specifies the substitute species, *Mysidopsis bahia,* which now has been renamed *Americamysis bahia.* For the March 2006 sampling, *Penaeus vannami* was not available and *Americamysis bahia* was used.

Effluent samples were collected from the StarKist Samoa and COS Samoa Packing facilities as 24-hour composite samples. The acute effluent bioassay test was conducted using a combined, flow-weighted, composite effluent sample made up from the effluent samples from both canneries, as allowed by the NPDES permit condition. This combined effluent bioassay is representative of the wastewater discharged from the joint cannery outfall to Pago Pago Harbor.

Effluent Sampling Methods

Between 09:00 on 28 February 2006 and 06:00 on 1 March 2006, a 24-hour flow-weighted composite sample of final effluent was collected from both the StarKist Samoa and COS Samoa Packing effluent discharges. Samples were collected from the established effluent sampling sites. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers at each cannery. Samples were collected at approximately three-hour intervals over the 24-hour period. The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected a 5-gallon flow-proportioned composite sample was prepared. The grab sample collection times, effluent flow rates, and the relative effluent flow volumes calculated from plant flow records are summarized in Table 1. The relative effluent flow volumes were used to prepare the final composite sample, which was used to fill the sample container shipped to the laboratory for testing.

A 5-gallon cubitainer containing the composite sample was packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the sample was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The sample was shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Table 1
StarKist Samoa and COS Samoa Packing
24-hour Composite Effluent Sample for Bioassay Testing
March 2006

Grab Sample Number	COS Samoa Packing		StarKist Samoa		COS Samoa Packing Percent of Total Flow	StarKist Samoa Percent Of Total Flow
	Sampling Date and Time	Effluent Flow Rate (mgd)	Sampling Date and Time	Effluent Flow Rate (mgd)		
28 February 2006						
1	09:00	0.88	09:00	1.98	3.57	8.02
2	12:00	0.84	12:00	2.63	3.40	10.66
3	15:00	0.84	15:00	2.61	3.40	10.58
4	18:00	0.80	18:00	1.94	3.24	7.86
5	21:00	0.80	21:00	1.95	3.24	7.91
1 March 2006						
6	00:00	0.80	00:00	2.16	3.24	8.77
7	03:00	0.88	03:00	2.53	3.57	10.25
8	06:00	0.88	06:00	2.15	3.57	8.71
Total		6.72 [A]		17.95 [A]	27.2%	72.8%
Mean		0.84		2.24	Total = %100	

[A] Numerical total of column for calculation purposes. Total flow over period will be approximately the calculated mean.

Bioassay Testing Procedures

EnviroSystems, Inc. located in Hampton, New Hampshire conducted the bioassay tests. The testing procedures and results of the bioassay tests are provided in the laboratory report included as Attachment II. This report summarizes the 96-hour acute bioassay test conducted with reference to the (USEPA) document Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms (EPA-821-R-02-012), 2002 as the source of methods for conducting the test. The

bioassay test was conducted considering and including USEPA's comments on previous bioassay tests, as documented in previous reports.

The test organisms were ≤ 5 days old and the test temperature was to be held at a nominal 20 °C, with actual temperatures ranging between 19°C and 21°C. Salinity was adjusted to 25 ppt at the start of the test and ranged during the test between 24 and 28 ppt.

Demonstrated potential for a lethal immediate dissolved oxygen demand (IDOD) and a delayed dissolved oxygen demand spike (DDOD) had been discussed and documented in previous technical memoranda, which describe the first two tests conducted in 1993. Therefore, all of the bioassay test chambers should have been continuously aerated during the bioassay tests to maintain adequate levels of dissolved oxygen (DO)[2]. The test should also be renewed with pre-oxygenated effluent sample at 48 hours. However, the laboratory failed to follow these procedures during this test and the DO went to lethally low levels in the higher effluent concentrations within the twenty four hours of the test. (See the Laboratory Report in Attachment II.)

Because of the low DO levels the toxicity of the effluent could not be determined. The apparent toxicity caused by the low DO levels is higher than the actual toxicity. Since the results of the test show that the apparent toxicity (although masked by low DO levels) is still reduced to acceptable levels well within the ZID, the results of the test are being reported below. However, the canneries intend to re-run the test. The new results will be reported when available.

Bioassay tests were carried out for effluent concentrations of 100, 75, 50, 25, 12.5, and 6.25 percent as vol:vol dilutions in seawater. Water quality was monitored daily and parameters measured included DO, pH, salinity, and temperature. Total residual chlorine and ammonia were measured. Water quality data are provided in the Laboratory Report (Attachment II). Reference toxicant tests using sodium dodecyl sulfonate (SDS) are conducted regularly by ESI with the last one completed on 4 January 2006 and results were within the acceptable range based on the 20 most recent laboratory tests.

[2] The high initial dilution of the actual effluent discharge (>100:1) into the Harbor, in a very short time, eliminates any concern about IDOD effects in the receiving water.

Summary Results: Americamysis bahia Effluent Bioassay

All results from the bioassay tests are included in Attachment II. The results of the mysid bioassay tests indicate the 96-hour LC_{50} for the effluent tested was 35.6% percent. The no observable effects concentration (NOEC) for the 96-hour bioassay was 25 percent and the least observable effects concentration (LOEC) was 50 percent. Results on a daily basis are summarized in Table 2.

Table 2
StarKist Samoa and COS Samoa Packing
Combined Effluent Bioassay Results
March 2006 Sampling

Exposure Time	Parameter		
	LC_{50}	NOEC	LOEC
24 hours	>100%	100%	>100%
48 hours	>63.3%	50%	75%
72 hours	>35.8%	25%	50%
96 hours	>35.6%	25%	>50%

Discussion

Table 3 summarizes the results of the effluent bioassay tests for the samples collected in the March 2006 sampling compared to the previous bioassay tests. The LC_{50}, NOEC, and LOEC are within the range obtained from previous tests where *Americamysis bahia* (*Mysidopsis bahia*) was used in place of *Penaeus vannami*. Figure 1 summarizes the LC_{50} for the mysid and penaeid tests done since February 1993. Figure 2 presents the range of LC_{50} results for mysids tests conducted since 1994. There is some variability observed in test results. The March 2006 test results are among the highest LC_{50} values recorded for this organism, but because of the DO problems during the test are lower than the results from the last 2½ years. Higher LC_{50} values indicate lower whole effluent toxicity. There is a possible trend toward lower toxicity (higher LC_{50}) with time (see Figure 2).

Conclusions

The bioassay tests for the Joint Cannery Outfall effluent for March 2006 do not indicate effluent toxicity levels to be of concern. As discussed in the previous bioassay test reports on the effluent, the time scale of the mixing of the effluent with the receiving water is on the order of seconds to achieve dilutions that will eliminate possible toxic effects as reflected by the bioassay results. For example, an LC_{50} of 35.6 percent after 96 hours of exposure, which was observed in March 2006, corresponds to a dilution of 2.8:1, which is achieved within one second and within one meter of the discharge point. The discharge is located in about 180 feet of water

and the effluent toxicity tests indicate that the discharge is diluted to non-toxic levels immediately after discharge and well within the initial dilution plume.

An LC_{50} of 35.6percent corresponds to 2.8 acute toxicity units (TU_a). A dilution of less than 10:1 will reduce the toxicity to less than 0.3 TU_a which is considered the acceptable level for the protection of aquatic life. The JCO achieves an initial dilution, under critical conditions of greater than 300:1. Therefore, at the edge of the zone of initial dilution (ZID) the acute toxicity is 0.11 TU_a for the LC_{50} documented in this test. Since the test appears to be compromised by low DO depressions during the test the actual toxicity at the edge of the ZID is expected be even lower.

Table 3
StarKist Samoa and COS Samoa Packing
Combined Effluent Bioassay Results

Date	Species	Parameters		
		LC_{50}	NOEC	LOEC
2/93	*Penaeus vannami*	4.8%[1]	3.1%	6.25%
10/93	*Penaeus vannami*	15.67%	3.1%	6.25%
2/94	*Penaeus vannami*	15.76%	<1.6%	1.6%
10/94	*Mysidopsis bahia*[2]	31.2%	25%	50%
3/95	*Penaeus vannami*	14.8%	6.25%	12.5%
3/95	*Mysidopsis bahia*[3]	10.8%	6.25%	12.5%
2/96	*Penaeus vannami*	>50%	>50%	>50%
2/96	*Mysidopsis bahia*[3]	28.36%	12.5%	25%
3/96	*Penaeus vannami*	44.4%	25%	50%
11/96	*Penaeus vannami*	7.11%	3.1%	6.25%
03/97	*Penaeus vannami*	39.36%	12.5%	25%
09/97	*Penaeus vannami*[4]	12.3%	6.25%	12.5%
06/98	*Mysidopsis bahia*[2]	17.2%	6.25%	12.5%
11/98	*Mysidopsis bahia*[2]	15%	6.25%	12.5%
02/00	*Mysidopsis bahia*[2]	20%	6.25%	12.5%
08/00	*Mysidopsis bahia*[2]	17.1%	3.1%	6.25%
03/01	*Americamysis bahia*[2,5]	13.8%	12.5%	25%
10/01	*Americamysis bahia*[2,6]	37.5%	25%	50%
3/02	*Americamysis bahia*[2,6]	16.1%	12.5%	25%
8/02	*Americamysis bahia*[2,6]	10.23%	6.25%	12.5%
03/03	*Americamysis bahia*[2,6]	28.4%	25%	50%
08/03	*Americamysis bahia*[2,6]	43.2%	25%	50%
02/04	*Americamysis bahia*[2,6]	>50%	50%	>50%
09/04	*Americamysis bahia*[2,6]	>50%	50%	>50%
03/05	*Americamysis bahia*[2,6]	48.5%	25%	50%
08/05	*Americamysis bahia*[2,6]	>50%	50%	>50%
03/06	*Americamysis bahia*[2,6]	**35.6%**[7]	**25%**	**50%**

[1]The February 1993 samples were not aerated until after the first day of the test. For subsequent tests the samples were aerated for the entire duration of the tests.
[2]*Mysidopsis bahia* used as substitutes because *Penaeus vannami* not available: as directed and approved by USEPA.
[3]*Mysidopsis bahia* used in addition to *Penaeus vannami* as described in text of technical memorandums reporting test results. Only one species is required by the permit conditions.
[4]Stage 1 (3 mm) *Penaeus vannami* were used for testing because older Stage 7 and 8 (8-10 mm) *Penaeus vannami* were not available.
[5]*Mysidopsis bahia* renamed *Americamysis bahia.* Results indicate increased toxicity because of low DO in renewal concentrations as renewal water was not aerated prior to use
[6] *Mysidopsis bahia* renamed *Americamysis bahia*
[7]Results for this test depressed because aeration was not provided (see text).

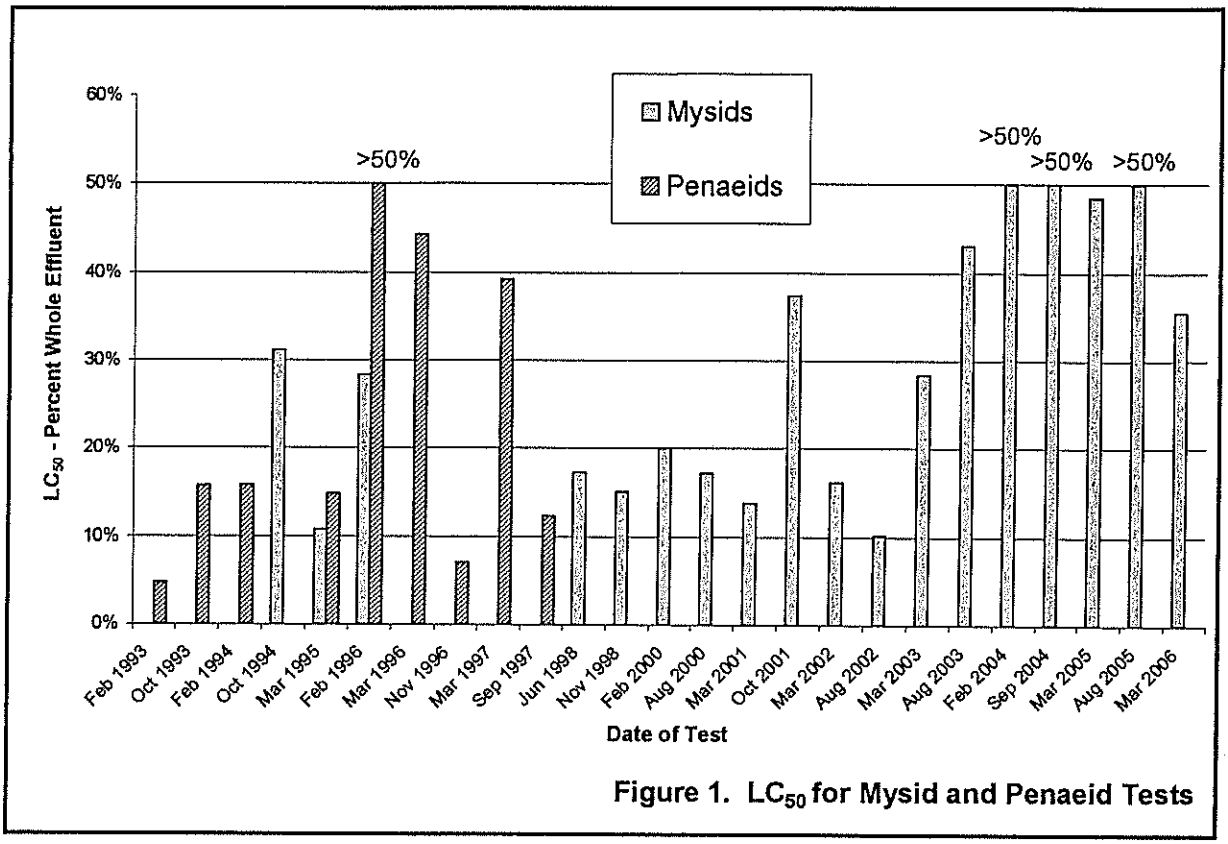


Figure 1. LC_{50} for Mysid and Penaeid Tests

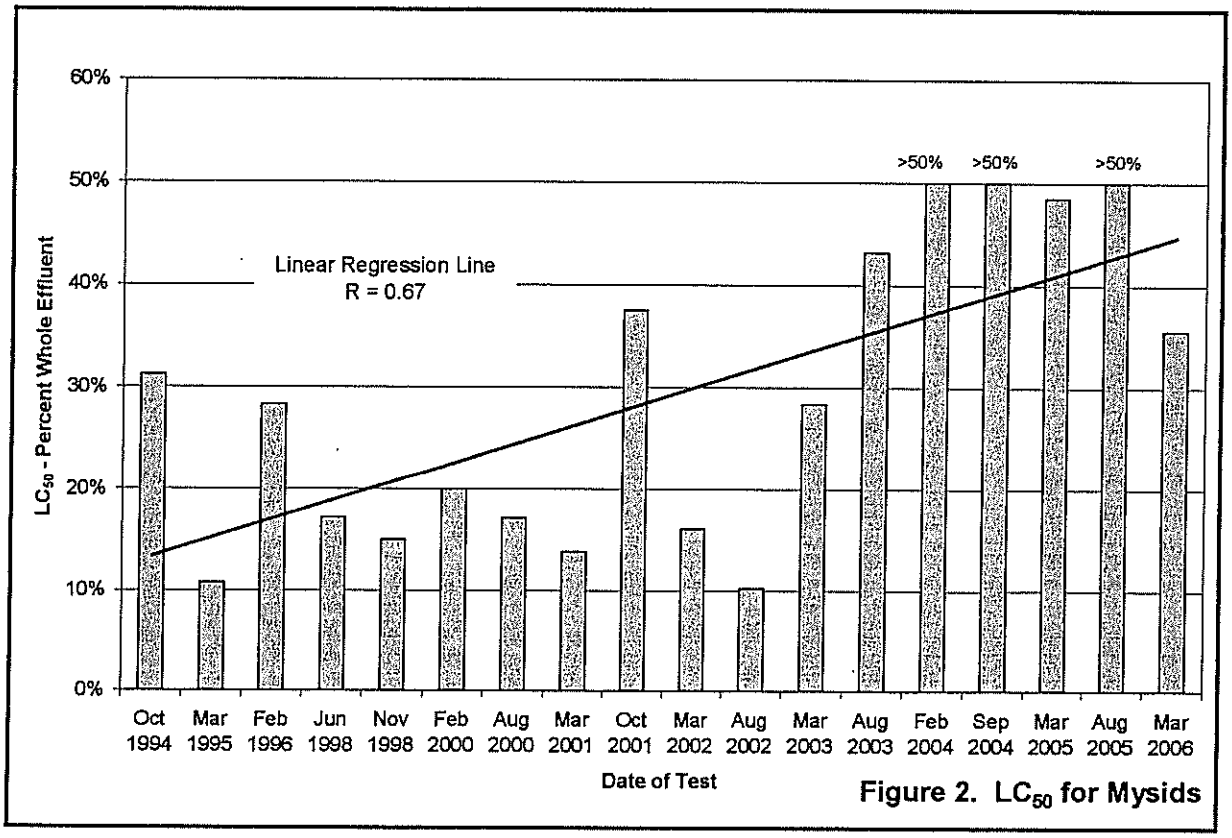


Figure 2. LC_{50} for Mysids

ATTACHMENT I

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Shipment Value Protection (see reverse)

☐ Yes Declared Value for Carriage (in US $) ____

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2 | From (Shipper)

Shipper's Account Number:

Contact Name: JOE CARNEY

Shipper's Reference (up to 35 characters): 147323 JC 06 NT

Company Name: STARKIST SAMOA

Address: PAGO PAGO AMERICAN SAMOA

Post/ZIP Code (required): 96799

Phone, Fax, or E-mail (required): 684-644-4231

3 | To (Receiver)

Company Name: ENVIROSYSTEMS INC

Contact Name: PETRA KARBE / BRIAN BUZBY

Delivery Address (DHL Cannot Deliver to a PO Box): ONE LAFAYETTE ROAD HAMPTON NEW HAMPSHIRE

Country: USA

Post/ZIP Code (required): 03842

Phone, Fax, or E-mail (required): 603-926-3345

4 | Shipment Details

Total Number of Packages	Total Weight	Pieces	Length	Width	Height
1	10 lbs	1	18	22	14

7820788485

5 | Full Description of Contents

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WATER QUALITY SAMPLE FOR LABORATORY ANALYSIS NO COMMERCIAL VALUE

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Export License No./Symbol (if applicable) | Receiver's VAT/GST or Shipper's EIN/SSN

Value for Customs (in US $) (as on Commercial/Pro Forma Invoice): 850

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TYPE OF EXPORT: ☐ Permanent ☐ Repair/Return ☐ Temporary

Destination Duties/Taxes if left blank, Receiver pays duties/taxes: ☐ Receiver ☐ Shipper ☐ Other 920701629 (Specify approved account number)

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SERVICES	CHARGES
Drop Box #	TOTAL

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PAYMENT DETAILS (Check, Card No.)

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Type: Express

Auth.

PICKED UP BY: 26

Route No.

Time: 1415 Date: 3/2

14320

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APPLIED SCIENCES LABORATORY

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Purchase Order #:
Project Name: JOINT CANNERY OUTFALL
Company Name/CH2M HILL Office: CH2M HILL
Project Manager & Phone #: Mr. [X] Ms. [ ] Dr. [ ] STEVE COSTA
Report Copy to: SAME 707-677-0123
Requested Completion Date:
Sampling Requirements: SDWA [ ] NPDES [X] RCRA [ ] OTHER —
Sample Disposal: Dispose [X] Return [ ]

LAB TEST CODES

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Lab 1 #: Lab 2 #:
Quote #: Kit Request #:
Project #:
No. of Samples: Page of
Login #: LIMS Ver:

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	Matrix AIR	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	ANALYSES REQUESTED: 96 HR STATIC BIOASSAY WITH MYSID	REMARKS	LAB 1 ID	LAB 2 ID
2/28-3/1/06		X		X			Ø6NT	1	X	*		

001

Sampled By & Title (Please sign and print name): [signature] — Date/Time: 3/1/2006
Relinquished By (Please sign and print name): [signature] — Date/Time: 3/2/2006
Received By (Please sign and print name): Shelli Jackman — Date/Time: 3/8/06
Relinquished By (Please sign and print name): — Date/Time:
Received By (Please sign and print name): — Date/Time:
Relinquished By (Please sign and print name): — Date/Time:
Received By (Please sign and print name): — Date/Time:
Shipped Via: UPS BUS Fed-Ex Hand Other DHL — Shipping # 782-0788-485
Work Authorized By (Please sign and print name):
Remarks: * DILUTIONS @ 100, 75, 50, 25, 12.5, 6.25 % EFFLUENT

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Ana Req: TEMP:
Cust Seal: Ph:

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ATTACHMENT II

EnviroSystems, Inc. Laboratory Report

TOXICOLOGICAL EVALUATION OF A TREATED EFFLUENT: BIOMONITORING SUPPORT FOR A NPDES PERMIT MARCH 2006

American Samoa Joint Cannery Outfall

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March 2006
Reference Number CH2M-Samoa14326-06-03

STUDY NUMBER 14326

EXECUTIVE SUMMARY

The following summarizes the results of acute exposure bioassays performed from March 8-12, 2006 in support of the NPDES biomonitoring requirements of the American Samoa Joint Cannery Outfall. The 96 hour acute definitive assay was conducted using the marine species, *Americamysis bahia.*

Acute Toxicity Evaluation

Species	Exposure	LC-50	NOEC	LOEC
Americamysis bahia	24-Hours	>100%	100%	>100%
	48-Hours	63.3%	50%	75%
	72-Hours	35.8%	25%	50%
	96-Hours	35.6%	25%	50%

TOXICOLOGICAL EVALUATION OF A TREATED EFFLUENT: BIOMONITORING SUPPORT FOR A NPDES PERMIT MARCH 2006

American Samoa Joint Cannery Outfall

1.0 INTRODUCTION

Acute toxicity tests involve preparing a series of concentrations by diluting effluent with control water. Groups of test organisms are exposed to each effluent concentration and a control for a specified period. In acute tests, mortality data for each concentration are used to calculate (by regression) the median lethal concentration, or LC-50, defined as the effluent concentration which kills half of the test organisms. Samples with high LC-50 values are less likely to cause significant environmental impact. The acute no observed effect concentration (NOEC) and lowest observed effect concentration (LOEC) document the highest and lowest effluent concentrations that have no impact and a significant impact on the test species, respectively.

This report presents the results of an acute toxicity test conducted on an effluent sample collected from the American Samoa Joint Cannery Outfall. Testing was based on programs and protocols developed by the US EPA (2002) and involved conducting 96 hour acute static renewal toxicity tests with the marine species, *Americamysis bahia*. Testing was performed at EnviroSystems, Incorporated (ESI), Hampton, New Hampshire in accordance with the provisions of the NELAC Standards (2000).

2.0 MATERIALS AND METHODS

2.1 General Methods

Toxicological and analytical protocols used in this program follow procedures primarily designed by the EPA to provide standard approaches for the evaluation of toxicological effects of discharges on aquatic organisms, and for the analysis of water samples. See Section 4.0 for a list of references.

2.2 Test Species

Every attempt was made to acquire the species, *Penaeus vannami,* as this is the preferred organism under the Cannery's permit. ESI was unable to obtain reasonably priced *P. vannami.* Due to the exorbitant expense, the decision was made to use an alternate species, *Americamysis bahia*.

A. bahia, ≤5 days old, were from cultures maintained at Aquatic Research Organisms. Test organisms were transferred to test chambers by large bore pipet, minimizing the amount of water added to test solutions.

2.3 Effluent and Dilution Water

The effluent sample used in the assay was identified as "06NT." Sample collection information is provided in Table 1. Upon receipt, the sample was stored at 4°C. All sample material used in the assay was warmed to 20±1°C prior to preparing test solutions. Total residual chlorine (TRC) was measured using amperometric titration (MDL 0.05 mg/L). As the effluent sample contained <0.05 mg/L, TRC dechlorination with sodium thiosulfate was not required (EPA 2002). Aliquots of the undiluted effluent sample were collected for ammonia analysis when the sample arrived and again prior to renewal. Upon arrival, the effluent sample had a salinity of 11‰. Salinity of the effluent was increased to 25‰ by the addition of artificial sea salts. Test concentrations for the assays were 100%, 75%, 50%, 25%, 12.5%, and 6.25% effluent with a laboratory water diluent control.

The dilution water used in this assay was collected from the sea water system at ESI. The water is pumped in daily from the Hampton Estuary on the flood tide, filtered through a high volume sand filter, and stored in 3000 gallon polyethylene tanks. The water is classified as Class SA-1 by the State of New Hampshire, and has been used to culture test organisms for over 20 years. Sea water used in the assay had a salinity of 25±2‰ and a TRC of <0.05 mg/L.

2.4 Acute Toxicity Tests

The 96 hour acute static renewal toxicity test was conducted at 20±2°C with a photoperiod of 16:8 hours light:dark. Test chambers for the acute assays were 250 mL glass beakers containing 200 mL test solution in each of 5 replicates, with 10 organisms/replicate. Survival, dissolved oxygen, pH, salinity and temperature were measured daily in all replicates. Test solutions were renewed after 48 hours using effluent from the start sample. Mysid shrimp were fed daily with <24 hour old brine shrimp.

2.5 Data Analysis

At 24 hour intervals, survival data was analyzed to assess toxicity using CETIS, Comprehensive Environmental Toxicity Testing System, software. The program computes acute exposure endpoints based on EPA decision tree guidelines specified in individual test methods. For acute exposure endpoints statistical significance was accepted at $\propto$ <0.05.

2.6 Quality Control

As part of the laboratory quality control program, standard reference toxicant assays are conducted on a regular basis for each test species. These results provide relative health and response data while allowing for comparison with historic data sets. See Table 2 for details.

3.0 RESULTS

Results of the acute exposure bioassay conducted using the mysid shrimp, *A. bahia*, are summarized in Table 3. Effluent and dilution water characteristics are presented in Table 4. Table 5 provides a summary of historic data associated with the discharge. Support data are included in Appendix A.

3.1 Acute Toxicity Test - *Americamysis bahia*

Minimum test acceptability criteria require ≥90% survival in the control concentration. As the laboratory water diluent control met or exceeded this protocol specification, results associated with the assay indicate healthy test organisms and that the dilution water had no adverse impact on the outcome of the assay. These data are considered as valid for evaluating impacts associated with the effluent sample.

Table 3 provides a summary of the acute exposure data and results.

3.2 Summary

The salinity adjusted effluent sample collected from the American Samoa Joint Cannery Outfall did exhibit signs of acute toxicity to the mysid shrimp, *Americamysis bahia,* during the 96 hour exposure period.

4.0 LITERATURE CITED

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Stephan, C. 1982. Documentation for Computing LC-50 Values with a Mini Computer. Unpublished.

US EPA. 2002. *Attachment G: NPDES Whole Effluent Toxicity Testing, Monitoring and Reporting Tips and Common Pitfalls.* Dated December 2002. US EPA Region I Offices, Boston, Massachusetts.

U.S. EPA. 2002. *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms.* Fifth Edition. EPA-821-R-02-012.

TABLE 1. Summary of Sample Collection Information. American Samoa Joint Cannery Outfall Effluent Evaluation. March 2006.

Sample Description	Type	Collection Date	Collection Time	Receipt Date	Receipt Time	Arrival Temp °C
EFFLUENT	Comp	02/28-03/01/06	ND	03/08/06	1240	0

TABLE 2. Summary of Reference Toxicant Data. American Samoa Joint Cannery Outfall Effluent Evaluation. March 2006.

Date	Endpoint		Value	Historic Mean/ Central Tendency	Acceptable Range	Reference Toxicant
A. bahia						
01/04/06	Survival	LC-50	17.6	20.1	14.8 - 25.3	SDS (mg/L)

Means and Acceptable Ranges based on the most recent 20 reference toxicant assays

TABLE 3A. Summary of Acute Evaluation Results. American Samoa Joint Cannery Outfall Effluent Evaluation. March 2006.

Concentration % Effluent	Exposure	Replicates A	B	C	D	E	Mean	Standard Deviation	Coefficient of Variation
Lab Control	Start	10	10	10	10	10	100%	0.000	0.00%
	24-Hours	10	10	10	10	10	100%	0.000	0.00%
	48-Hours	10	10	10	10	10	100%	0.000	0.00%
	72 Hours	9	10	9	10	9	94%	0.055	5.85%
	96-Hours	8	10	9	10	9	92%	0.084	9.13%
6.25%	24-Hours	10	10	10	10	10	100%	0.000	0.00%
	48-Hours	9	10	10	10	10	98%	0.045	4.59%
	72 Hours	9	10	10	10	10	98%	0.045	4.59%
	96-Hours	9	10	8	10	10	94%	0.110	11.70%
12.5%	24-Hours	10	10	10	10	10	100%	0.000	0.00%
	48-Hours	10	10	10	10	10	100%	0.000	0.00%
	72 Hours	10	10	10	10	10	100%	0.000	0.00%
	96-Hours	10	9	10	8	10	94%	0.089	9.47%
25%	24-Hours	10	10	10	10	10	100%	0.000	0.00%
	48-Hours	10	10	10	10	10	100%	0.000	0.00%
	72 Hours	10	10	10	9	10	98%	0.045	4.59%
	96-Hours	9	10	10	7	10	92%	0.130	14.13%
50%	24-Hours	10	10	10	10	10	100%	0.000	0.00%
	48-Hours	10	10	10	0	9	78%	0.438	56.15%
	72 Hours	1	0	0	0	0	2%	0.045	225.00%
	96-Hours	1	0	0	0	0	2%	0.045	225.00%
75%	24-Hours	10	10	10	10	10	100%	0.000	0.00%
	48-Hours	3	5	0	7	7	44%	0.297	67.50%
	72 Hours	0	0	0	0	0	0%	0.000	0.00%
	96-Hours	0	0	0	0	0	0%	0.000	0.00%
100%	24-Hours	10	9	10	8	9	92%	0.084	9.13%
	48-Hours	0	0	0	0	0	0%	0.000	0.00%
	72 Hours	0	0	0	0	0	0%	0.000	0.00%
	96-Hours	0	0	0	0	0	0%	0.000	0.00%

TABLE 3B. Summary of Acute Evaluation Results. American Samoa Joint Cannery Outfall Effluent Evaluation. March 2006.

SUMMARY OF ENDPOINTS

Exposure Period	LC-50 (95% Limits)	METHOD	NOEC	LOEC
24 Hours	>100%	Direct Observation	100%	>100%
48 Hours	63.3% (58.3-68.7)	Trimmed Spearman-Karber	50%	75%
72 Hours	35.8% (35.0-36.6)	Trimmed Spearman-Karber Direct Observation	25%	50%
96 Hours	35.6% (34.6-36.6)	Trimmed Spearman-Karber Direct Observation	25%	50%

TABLE 4. Summary of Effluent and Diluent Characteristics. American Samoa Joint Cannery Outfall Effluent Evaluation. March 2006.

PARAMETER	UNITS	100% EFFLUENT	50% EFFLUENT	DILUENT
Salinity - As Received	‰	11	-	25
Salinity - After Salinity Adjustment	‰	25	25	-
pH - As Received	SU	6.46	-	7.87
pH - After Salinity Adjustment	SU	7.07	7.22	-
TRC - As Received	mg/L	<0.05	-	<0.05
Dissolved Oxygen - As Received	mg/L	1.3	-	-
Dissolved Oxygen - After Aeration	mg/L	3.6	5.8	7.3
Ammonia - As Received	mg/L as N	23.4	-	<0.1
Unionized Ammonia - As Received	mg/L as N	0.084	-	<0.003
Ammonia - Salinity Adjusted	mg/L as N	-	13	-
Unionized Ammonia - Salinity Adjusted	mg/L as N	-	0.085	-
Ammonia - at 48 Hours	mg/L as N	ND	ND	ND
Unionized Ammonia - at 48 Hours	mg/L as N	ND	ND	ND

Comments: ND= No data. 48 hour ammonia data is not available due to a technician error.

TABLE 5. Summary of StarKist Samoa and COS Samoa Packing Combined Effluent Bioassay Results. American Samoa Joint Cannery Outfall Effluent Evaluation. March 2006.

Date	Species	96-Hour Endpoints		
		LC-50	NOEC	LOEC
02/93[1]	*Penaeus vannami*	4.8%	3.1%	6.25%
10/93[1]	*Penaeus vannami*	15.67%	3.1%	6.25%
02/94[1]	*Penaeus vannami*	15.76%	<1.6%	1.6%
10/94[1]	*Americamysis bahia*	31.2%	25.0%	50.0%
03/95[1]	*Penaeus vannami*	14.8%	6.25%	12.5%
03/95[1]	*Americamysis bahia*	10.8%	6.25%	12.5%
02/96[1]	*Penaeus vannami*	>50.0%	>50.0%	>50.0%
03/96[1]	*Penaeus vannami*	44.4%	25.0%	50.0%
11/96[1]	*Penaeus vannami*	7.11%	3.1%	6.25%
03/97[1]	*Penaeus vannami*	39.36%	12.5%	25.0%
09/97[1]	*Penaeus vannami*	12.3%	6.25%	12.5%
06/98[1]	*Americamysis bahia*	17.2%	6.25%	12.5%
11/98[1]	*Americamysis bahia*	15.0%	6.25%	12.5%
02/00[1]	*Americamysis bahia*	20.0%	6.25%	12.5%
08/00[1]	*Americamysis bahia*	17.1%	3.1%	6.25%
03/01[2]	*Americamysis bahia*	13.81%	12.5%	25.0%
03/02[2]	*Americamysis bahia*	16.13%	12.5%	25.0%
08/02[2]	*Americamysis bahia*	10.23%	6.25%	12.5%
03/03[2]	*Americamysis bahia*	28.4%	25.0%	50.0%
08/03[2]	*Americamysis bahia*	43.2%	25.0%	50.0%
03/04[2]	*Americamysis bahia*	>50.0%	50.0%	>50.0%
10/04[2]	*Americamysis bahia*	>50.0%	50.0%	>50.0%
03/05[2]	*Americamysis bahia*	48.5%	25%	50%
10/05[2]	*Americamysis bahia*	>50.0%	50%	>50
03/06[2]	*Americamysis bahia*	35.6%	25%	50%

Notes:

1. Assays conducted by Advanced Biological Testing, Inc., Rohnert Park, California
2. Assays conducted by EnviroSystems, Inc., Hampton, New Hampshire

APPENDIX A

DATA SHEETS

STATISTICAL SUPPORT

METHODS USED IN NPDES PERMIT BIOMONITORING TESTING

Parameter	Method
Acute Exposure Bioassays	
Ceriodaphnia dubia, Daphnia pulex	EPA-821-R-02-012
Pimephales promelas	EPA-821-R-02-012
Americamysis bahia	EPA-821-R-02-012
Menidia beryllina, Cyprinodon variegatus	EPA-821-R-02-012
Chronic Exposure Bioassays	
Ceriodaphnia dubia	EPA-821-R-02-013, 1002.0
Pimephales promelas	EPA-821-R-02-013, 1000.0
Cyprinodon variegatus	EPA-821-R-02-014, 1004.0
Menidia beryllina	EPA-821-R-02-014, 1006.0
Arbacia punctulata	EPA-821-R-02-014, 1008.0
Champia parvula	EPA-821-R-02-014, 1009.0
Trace Metals:	
ICP Metals	EPA 200.7/SW 6010
Hardness	Standard Methods 20th Edition - Method 2340 B
Wet Chemistries:	
Alkalinity	EPA 310.2
Chlorine, Residual	Standard Methods 20th Edition - Method 4500CLD
Total Organic Carbon	Standard Methods 20th Edition - Method 5310C
Specific Conductance	Standard Methods 20th Edition - Method 2510B
Nitrogen - Ammonia	Standard Methods 20th Edition - Method 4500NH3G
pH	Standard Methods 20th Edition - Method 4500H+B
Solids, Total (TS)	Standard Methods 20th Edition - Method 2540.B
Solids, Total Suspended (TSS)	Standard Methods 20th Edition - Method 2540D
Dissolved Oxygen	Standard Methods 20th Edition - Method 4500-O G

ACUTE BIOASSAY DATA SUMMARY

STUDY: 14326

CLIENT: CH2M Hill | TEST ORGANISM: *A. bahia*

SAMPLE: American Samoa | ORGANISM SUPPLIER/BATCH/AGE: *See Organism Culture Sheet*

DILUENT: LAB SALT

"AS RECEIVED" EFFLUENT AND DILUENT CHEMISTRIES

	TRC	AMM 0 HR✖	AMM 48 HR✖	pH	DO	Salinity
EFFLUENT	See "EFFLUENT & DILUENT CHEMISTRY and WATER QUALITY DATA" sheet					
DILUENT						

SALINITY ADJUSTMENT RECORD (IF APPLICABLE): 8000 ML EFFLUENT + 125 G SEA SALTS = 100% ACTUAL PERCENTAGE

CONC	REP	SURVIVAL 0	24	48	72	96	✦DISSOLVED OXYGEN (MG/L)✦ 0	24	48◊	48☆	72	96	PH (SU) 0	24	48◊	48☆	72	96	TEMPERATURE (°C) 0	24	48◊	48	72	96	SALINITY (ppt) 0	24	48◊	48	72	96
LAB	A	10	10	10	9	8	7.3	7.4	7.0	7.1	7.3	7.2	7.87	7.92	7.86	7.95	7.97	7.87	19	19	20	21	21	19	25	26	27	25	26	27
	B	10	10	10	10	10	7.3	7.3	7.0	7.0	7.4	7.1	7.89	7.95	7.86	7.95	7.99	7.88	19	19	19	21	21	19	25	26	28	25	26	27
	C	10	10	10	9	9	7.3	7.3	7.0	7.0	7.4	7.1	7.90	7.95	7.90	7.95	7.97	7.87	19	19	19	21	20	19	25	26	28	26	25	27
	D	10	10	10	10	10	7.3	7.3	7.0	7.0	6.5	6.0	7.91	7.95	7.97	7.93	7.98	7.92	19	19	19	21	20	19	25	26	27	26	26	27
	E	10	10	10	9	9	7.3	7.5	4.3	7.0	6.5	6.1	7.91	7.98	7.96	7.85	7.91	7.91	19	19	19	21	20	19	25	27	28	25	26	28
6.25%	A	10	10	9	9	8	7.2	7.3	6.6	6.9	7.0	6.0	7.80	7.96	7.97	7.88	7.98	7.92	20	19	19	21	20	19	25	26	27	29	26	29
	B	10	10	10	10	10	7.2	7.2	6.9	6.7	7.2	6.8	7.80	7.93	7.94	7.89	7.99	7.94	20	19	19	21	21	19	25	26	27	25	26	27
	C	10	10	10	10	8	7.2	7.2	6.9	6.6	7.3	6.7	7.80	7.94	7.95	7.88	7.89	7.92	20	19	19	21	21	19	25	26	28	25	26	28
	D	10	10	10	10	10	7.2	7.2	7.0	6.5	6.9	6.3	7.80	7.97	8.00	7.90	7.92	7.92	20	19	20	21	20	19	25	26	29	25	26	27
	E	10	10	10	10	10	7.2	7.2	6.9	6.5	6.5	6.0	7.80	7.97	8.00	7.90	7.99	7.96	20	19	19	21	21	19	25	27	28	29	25	27
DATE		3/8/12	3/9	3/10	3-11	3-12	3/8	3/9	3-10	3-10	3-11	3-12																		
TIME		1520	1430	1430	1420	1320	1445	1330	1335	1500	1420	~~1420~~ 1320																		
INITIALS		SJ	WD	AP	AF	AF	SJ	WD	AF	AF	AF	AF																		
FED?																														

✖ - See:" EFFLUENT & DILUENT CHEMISTRY and WATER QUALITY DATA" sheet.
✦ - AERATE FROM START! ◊ - "Old" water qualities (prior to renewal) ☆ - "New"water qualities (post renewal)

ACUTE BIOASSAY DATA SUMMARY

STUDY: 14326	SAMPLE RECEIVED:	"AS RECEIVED" EFFLUENT AND DILUENT CHEMISTRIES	
CLIENT: CH2M Hill	TEST ORGANISM: *A. bahia*		TRC / AMM 0 HR✖ / AMM 48 HR✖ / pH / DO / Salinity
SAMPLE: American Samoa	ORGANISM SUPPLIER:	EFFLUENT	See "EFFLUENT & DILUENT CHEMISTRY and WATER QUALITY DATA" sheet
DILUENT: LAB SALT	ORGANISM BATCH/AGE:	DILUENT	

CONC	REP	SURVIVAL					✦DISSOLVED OXYGEN (MG/L)✦						PH (SU)						TEMPERATURE (°C)						SALINITY (ppt)					
		0	24	48	72	96	0	24	48◊	48☆	72	96	0	24	48◊	48☆	72	96	0	24	48◊	48	72	96	0	24	48◊	48	72	96
12.5%	A	10	10	10	10	10	6.9	6.8 / 7.46	6.5	6.4	7.0	6.1	7.70	7.86	7.99	7.74	7.97	7.86	20	19	19	21	20	19	25	26	28	26	27	27
	B	10	10	10	10	9	6.9	6.8	6.6	6.3	7.0	6.3	7.68	8.01	7.93	7.75	7.94	7.87	20	19	19	21	20	19	25	26	27	26	26	28
	C	10	10	10	10	10	6.9	6.8	6.6	6.1	7.0	7.0	7.68	8.01	7.96	7.72	8.10	7.87	20	19	19	21	20	19	25	26	27	26	27	28
	D	10	10	10	10	8	6.9	6.9	6.9	6.0	7.1	7.1	7.68	8.01	8.02	7.79	7.83	7.93	20	19	19	21	20	19	25	26	28	26	27	28
	E	10	10	10	10	10	7.0	7.1	6.7	6.2	7.2	7.1	7.68	8.01	8.06	7.78	7.97	7.90	20	19	20	21	21	19	25	27	28	26	27	28
25%	A	10	10	10	10	9	6.5	6.9	6.7	6.0	7.1	7.2	7.50	8.07	8.06	7.56	8.02	7.97	20	19	19	21	20	19	25	26	28	25	27	27
	B	10	10	10	10	10	6.5	6.7	6.6	5.8	7.3	7.3	7.47	8.07	8.05	7.57	8.01	7.98	20	19	19	21	21	19	25	27	27	25	27	27
	C	10	10	10	10	10	6.5	6.7	6.7	5.4	7.2	7.1	7.47	8.0	8.03	7.49	8.01	7.96	20	19	19	21	20	19	25	26	28	26	27	27
	D	10	10	10	9	7	6.5	6.7	6.7	5.3	7.1	7.1	7.47	8.00	8.07	7.49	7.93	7.89	20	19	19	21	21	19	25	26	29	26	27	27
	E	10	10	10	10	10	6.5	6.7	6.6	5.2	7.0	7.0	7.46	7.99	8.07	7.60	7.99	7.93	20	19	19	21	21	19	25	26	28	25	26	28
50%	A	10	10	10	1	1	5.8	5.9	6.6	5.2	7.1	7.3	7.22	8.04	8.12	7.27	8.10	7.91	20	19	19	21	21		25	26	26	25	27	27
	B	10	10	10	0	—	5.8	5.8	6.6	3.5	7.1	—	7.21	7.93	8.14	7.29	8.11	—	20	19	19	21	20	—	25	25	26	26	26	—
	C	10	10	10	0	—	5.8	5.4	6.6	3.5	7.0	—	7.20	7.97	8.13	7.21	8.10	—	20	19	19	21	20	—	25	26	27	25	26	—
	D	10	10	0	—	—	5.8	0.7 / 6.5	—	—	—	—	7.20	7.60	8.19	—	—	—	20	19	19	—	—	—	25	26	27	—	—	—
	E	10	10	9	0	—	5.6	5.3	6.6	3.9	7.2	—	7.20	8.03	8.18	7.20	8.09	—	20	20	20	21	20	—	25	26	27	25	27	—
DATE		3/8	3/9	3/10	3/11	3/12	3/8	3/9	3/10	3/10	3/11	3/12																		
TIME		1520	1430	1445	1420	1320	1445	1330	1335	1500	1420	1320																		
INITIALS		SJ	WD	AF	AF	AF	SJ	WD	AF	AF	AF	AF																		
FED?																														

✖ - See:" EFFLUENT & DILUENT CHEMISTRY and WATER QUALITY DATA" sheet.
✦ - AERATE FROM START! ◊ - "Old" water qualities (prior to renewal) ☆ - "New"water qualities (post renewal)

ACUTE BIOASSAY DATA SUMMARY

STUDY: 14326	SAMPLE RECEIVED:	"AS RECEIVED" EFFLUENT AND DILUENT CHEMISTRIES						
CLIENT: CH2M Hill	TEST ORGANISM: *A. bahia*		TRC	AMM 0 HR✖	AMM 48 HR✖	pH	DO	Salinity
SAMPLE: American Samoa	ORGANISM SUPPLIER:	EFFLUENT	See "EFFLUENT & DILUENT CHEMISTRY and WATER QUALITY DATA" sheet					
DILUENT: LAB SALT	ORGANISM BATCH/AGE:	DILUENT						

CONC	REP	SURVIVAL					✦DISSOLVED OXYGEN (MG/L)✦					
		0	24	48	72	96	0	24	48◊	48☆	72	96
75%	A	10	10	3	0	–	4.8	4.2	6.5	2.8	6.8	–
	B	10	10	5	0	–	4.6	4.2	6.6	2.6	6.9	–
	C	10	10	0	—	—	4.7	0.3	6.6	—	—	—
	D	10	10	7	0	–	4.7	4.1	6.6	2.5	7.1	–
	E	10	10	7	0	–	4.7	4.4	6.6	2.5	7.0	–
100%	A	10	10	0	—	—	3.6	3.6	6.5	2.8	6.8	6.7
	B	10	9	0	—	—	3.6	3.3	6.5	—	—	—
	C	10	10	0	—	—	3.6	1.7	6.3	—	—	—
	D	10	8	0	—	—	3.6	2.7	6.5	—	—	—
	E	10	9	0	—	—	3.6	3.2	6.4	2.8	—	—
DATE		3/8	3/9	3/10	3-11	3-12	3/8	3/9	3/10	3/10	3-11	3-12
TIME		1520	1430	1450	1420	1326	1445	1330	1335	1500	1420	1326
INITIALS		SJ	WD	AF	AF	AF	SJ	WD	AF	AF	AF	AF
FED?												

CONC	REP	PH (SU)						TEMPERATURE (°C)						SALINITY (ppt)					
		0	24	48◊	48☆	72	96	0	24	48◊	48	72	96	0	24	48◊	48	72	96
75%	A	7.87	7.91	8.19	7.18	8.13	–	20	20	19	20	20	–	24	25	26	26	26	–
	B	7.86	7.92	8.19	7.10	8.11	–	20	19	19	21	20	–	24	25	26	25	26	–
	C	7.86	7.78	8.19	—	—	—	20	19	19	—	—	—	24	25	26	—	—	—
	D	7.86	7.99	8.19	7.15	8.16	–	20	19	19	21	20	–	24	25	27	25	27	–
	E	7.86	8.03	8.30	7.20	8.20	–	20	20	19	21	20	–	24	26	27	25	26	–
100%	A	6.96	8.07	8.37	6.94	8.09	9.11	20	20	19	21	20	19	24	26	26	25	26	27
	B	6.96	8.05	8.41	—	—	—	20	20	19	—	—	—	24	26	26	—	—	—
	C	6.96	7.86	8.23	—	—	—	20	20	19	—	—	—	24	25	26	—	—	—
	D	6.96	7.98	8.23	—	—	—	20	20	19	—	—	—	24	25	27	—	—	—
	E	6.96	8.02	8.16	—	—	—	20	20	19	—	—	—	24	25	27	—	—	—

✖ - See:" EFFLUENT & DILUENT CHEMISTRY and WATER QUALITY DATA" sheet.
✦ - AERATE FROM START! ◊ - "Old" water qualities (prior to renewal) ☆ - "New"water qualities (post renewal)

CETIS Test Summary

Report Date: 16 Mar-06 5:33 PM
Link: 11-3381-8273

Americamysis 96-h Acute Survival Test — EnviroSystems, Inc.

Test No:	07-1088-3899	Test Type:	Survival (96h)	Duration:	94h
Start Date:	08 Mar-06 03:20 PM	Protocol:	EPA/821/R-02-012 (2002)	Species:	Americamysis bahia
Ending Date:	12 Mar-06 01:20 PM	Dil Water:	Natural Seawater	Source:	ARO - Aquatic Research Organisms, N
Setup Date:	08 Mar-06 03:20 PM	Brine:	Not Applicable		

Sample No:	02-2666-6345	Material:	Industrial Effluent	Client:	CH2M Hill
Sample Date:	01 Mar-06 12:00 PM	Code:	14326	Project:	WET Quarterly Compliance Test (1Q)
Receive Date:	08 Mar-06 12:00 PM	Source:	CH2M Hill- American Samoa		
Sample Age:	7d 3h	Station:	Joint Cannery Outfall		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
16-8050-0151	24h Proportion Survived	100	> 100	N/A	5.33%	Steel's Many-One Rank
14-9795-7901	48h Proportion Survived	50	75	61.237	27.87%	Steel's Many-One Rank
20-2463-6746	72h Proportion Survived	25	50	35.355	6.62%	Dunnett's Multiple Comparison
05-5702-4063	96h Proportion Survived	25	50	35.355	15.68%	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method
04-6135-6263	48h Proportion Survived	50	63.25922	58.26902	68.67678	Trimmed Spearman-Karber
13-7987-5949	72h Proportion Survived	50	35.75597	34.97713	36.55215	Trimmed Spearman-Karber
16-2376-3199	96h Proportion Survived	50	35.59903	34.61591	36.61006	Trimmed Spearman-Karber

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision
05-5702-4063	96h Proportion Survived	Control Response	0.92	0.9 - N/A	Passes acceptability criteria
16-2376-3199	96h Proportion Survived	Control Response	0.92	0.9 - N/A	Passes acceptability criteria

CETIS Test Summary

Report Date: 16 Mar-06 5:33 PM
Link: 11-3381-8273

24h Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
6.25		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
12.5		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
25		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
75		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		5	0.92000	0.80000	1.00000	0.03742	0.08367	9.09%

48h Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
6.25		5	0.98000	0.90000	1.00000	0.02000	0.04472	4.56%
12.5		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
25		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		5	0.78000	0.00000	1.00000	0.19596	0.43818	56.18%
75		5	0.44000	0.00000	0.70000	0.13266	0.29665	67.42%
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

72h Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	5	0.94000	0.90000	1.00000	0.02449	0.05477	5.83%
6.25		5	0.98000	0.90000	1.00000	0.02000	0.04472	4.56%
12.5		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
25		5	0.98000	0.90000	1.00000	0.02000	0.04472	4.56%
50		5	0.02000	0.00000	0.10000	0.02000	0.04472	223.61
75		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

96h Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	5	0.92000	0.80000	1.00000	0.03742	0.08367	9.09%
6.25		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%
12.5		5	0.94000	0.80000	1.00000	0.04000	0.08944	9.52%
25		5	0.92000	0.70000	1.00000	0.05831	0.13038	14.17%
50		5	0.02000	0.00000	0.10000	0.02000	0.04472	223.61
75		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

CETIS Test Summary

Report Date: 16 Mar-06 5:33 PM
Link: 11-3381-8273

24h Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Water	1.00000	1.00000	1.00000	1.00000	1.00000
6.25		1.00000	1.00000	1.00000	1.00000	1.00000
12.5		1.00000	1.00000	1.00000	1.00000	1.00000
25		1.00000	1.00000	1.00000	1.00000	1.00000
50		1.00000	1.00000	1.00000	1.00000	1.00000
75		1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	0.90000	1.00000	0.80000	0.90000

48h Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Water	1.00000	1.00000	1.00000	1.00000	1.00000
6.25		0.90000	1.00000	1.00000	1.00000	1.00000
12.5		1.00000	1.00000	1.00000	1.00000	1.00000
25		1.00000	1.00000	1.00000	1.00000	1.00000
50		1.00000	1.00000	1.00000	0.00000	0.90000
75		0.30000	0.50000	0.00000	0.70000	0.70000
100		0.00000	0.00000	0.00000	0.00000	0.00000

72h Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Water	0.90000	1.00000	0.90000	1.00000	0.90000
6.25		0.90000	1.00000	1.00000	1.00000	1.00000
12.5		1.00000	1.00000	1.00000	1.00000	1.00000
25		1.00000	1.00000	1.00000	0.90000	1.00000
50		0.10000	0.00000	0.00000	0.00000	0.00000
75		0.00000	0.00000	0.00000	0.00000	0.00000
100		0.00000	0.00000	0.00000	0.00000	0.00000

96h Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Water	0.80000	1.00000	0.90000	1.00000	0.90000
6.25		0.80000	1.00000	0.80000	1.00000	1.00000
12.5		1.00000	0.90000	1.00000	0.80000	1.00000
25		0.90000	1.00000	1.00000	0.70000	1.00000
50		0.10000	0.00000	0.00000	0.00000	0.00000
75		0.00000	0.00000	0.00000	0.00000	0.00000
100		0.00000	0.00000	0.00000	0.00000	0.00000

CETIS Analysis Detail

Americamysis 96-h Acute Survival Test — EnviroSystems, Inc.

Test No:	07-1088-3899	Test Type:	Survival (96h)	Duration:	94h
Start Date:	08 Mar-06 03:20 PM	Protocol:	EPA/821/R-02-012 (2002)	Species:	Americamysis bahia
Ending Date:	12 Mar-06 01:20 PM	Dil Water:	Natural Seawater	Source:	ARO - Aquatic Research Organisms, N
Setup Date:	08 Mar-06 03:20 PM	Brine:	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	11-3381-8273	11-3381-8273	16 Mar-06 5:22 PM	CETISv1.026

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		25	50	4.00	35.355	15.68%

Test Acceptability

Attribute	Statistic	Acceptable Range	Decision
Control Response	0.92	0.9 - N/A	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	3.04008	13.27671	0.55114	Equal Variances
Distribution	Shapiro-Wilk W	0.84838	0.88746	0.00137	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	4.896395	1.224099	4	59.64	0.00000	Significant Effect
Error	0.4104991	0.020525	20			
Total	5.30689383	1.2446236	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Water		6.25	28	17	> 0.0500	3	Non-Significant Effect
		12.5	29.5	17	> 0.0500	3	Non-Significant Effect
		25	29	17	> 0.0500	2	Non-Significant Effect
		50	15	17	<= 0.0500	3	Significant Effect

Data Summary

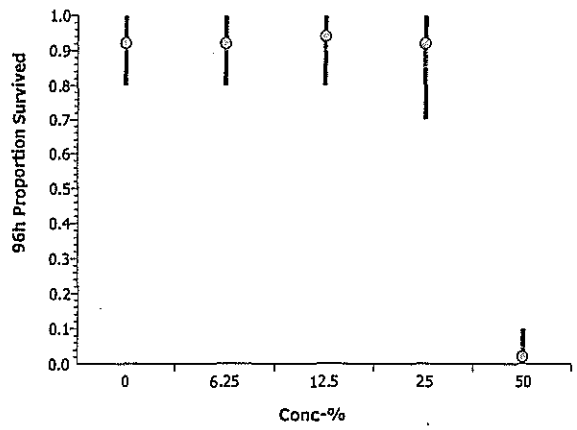
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	5	0.92000	0.80000	1.00000	0.08367	1.28585	1.10715	1.41202	0.12892
6.25		5	0.92000	0.80000	1.00000	0.10954	1.29007	1.10715	1.41202	0.16698
12.5		5	0.94000	0.80000	1.00000	0.08944	1.31845	1.10715	1.41202	0.13759
25		5	0.92000	0.70000	1.00000	0.13038	1.29525	0.99116	1.41202	0.18406
50		5	0.02000	0.00000	0.10000	0.04472	0.19137	0.15878	0.32175	0.07288

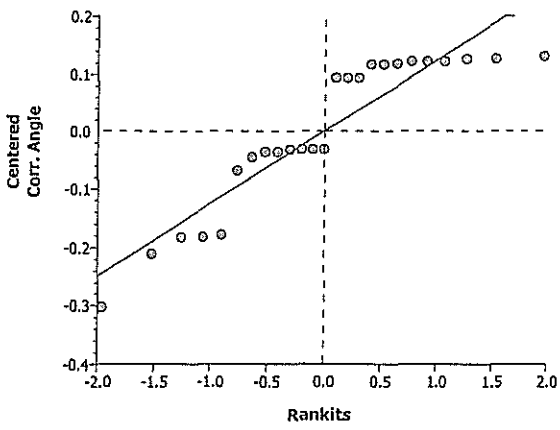
Data Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	0.80000	1.00000	0.90000	1.00000	0.90000					
6.25		0.80000	1.00000	0.80000	1.00000	1.00000					
12.5		1.00000	0.90000	1.00000	0.80000	1.00000					
25		0.90000	1.00000	1.00000	0.70000	1.00000					
50		0.10000	0.00000	0.00000	0.00000	0.00000					

CETIS Analysis Detail

Graphics





CETIS Analysis Detail

Americamysis 96-h Acute Survival Test — EnviroSystems, Inc.

Test No:	07-1088-3899	Test Type:	Survival (96h)	Duration:	94h
Start Date:	08 Mar-06 03:20 PM	Protocol:	EPA/821/R-02-012 (2002)	Species:	Americamysis bahia
Ending Date:	12 Mar-06 01:20 PM	Dil Water:	Natural Seawater	Source:	ARO - Aquatic Research Organisms, N
Setup Date:	08 Mar-06 03:20 PM	Brine:	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
48h Proportion Survived	Comparison	11-3381-8273	11-3381-8273	16 Mar-06 5:22 PM	CETISv1.026

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		50	75	2.00	61.237	27.87%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	2.41905	3.89507	0.06536	Equal Variances
Distribution	Shapiro-Wilk W	0.67006	0.89981	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	2.054252	0.4108503	5	5.80	0.00120	Significant Effect
Error	1.701514	0.0708964	24			
Total	3.7557658	0.4817467	29			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Water		6.25	25	16	> 0.0500	1	Non-Significant Effect
		12.5	27.5	16	> 0.0500	1	Non-Significant Effect
		25	27.5	16	> 0.0500	1	Non-Significant Effect
		50	22.5	16	> 0.0500	1	Non-Significant Effect
		75	15	16	<= 0.0500	2	Significant Effect

Data Summary

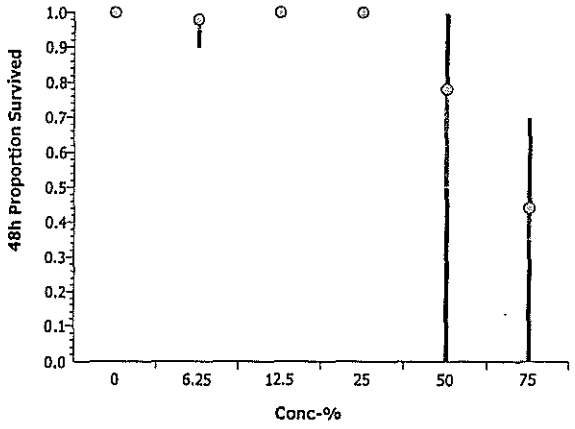
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	5	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00026
6.25		5	0.98000	0.90000	1.00000	0.04472	1.37942	1.24905	1.41202	0.07288
12.5		5	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00026
25		5	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00026
50		5	0.78000	0.00000	1.00000	0.43818	1.12877	0.15878	1.41202	0.54682
75		5	0.44000	0.00000	0.70000	0.29665	0.70123	0.15878	0.99116	0.34794

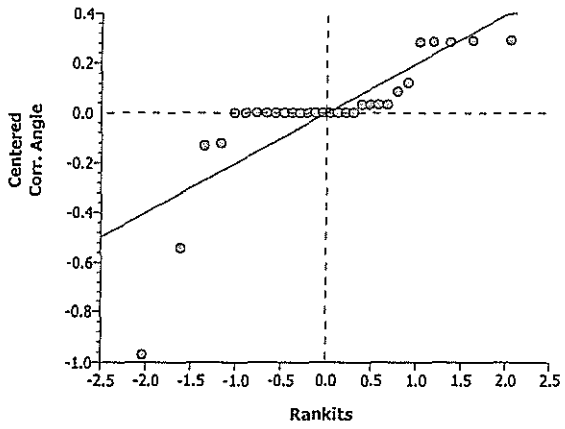
Data Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	1.00000	1.00000	1.00000	1.00000	1.00000					
6.25		0.90000	1.00000	1.00000	1.00000	1.00000					
12.5		1.00000	1.00000	1.00000	1.00000	1.00000					
25		1.00000	1.00000	1.00000	1.00000	1.00000					
50		1.00000	1.00000	1.00000	0.00000	0.90000					
75		0.30000	0.50000	0.00000	0.70000	0.70000					

CETIS Analysis Detail

Graphics





CETIS Analysis Detail

Americamysis 96-h Acute Survival Test — EnviroSystems, Inc.

Test No:	07-1088-3899	Test Type:	Survival (96h)	Duration:	94h
Start Date:	08 Mar-06 03:20 PM	Protocol:	EPA/821/R-02-012 (2002)	Species:	Americamysis bahia
Ending Date:	12 Mar-06 01:20 PM	Dil Water:	Natural Seawater	Source:	ARO - Aquatic Research Organisms, N
Setup Date:	08 Mar-06 03:20 PM	Brine:	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
24h Proportion Survived	Comparison	11-3381-8273	11-3381-8273	16 Mar-06 5:22 PM	CETISv1.026

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		100	>100	1.00	N/A	5.33%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	12.20194	3.52756	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.48733	0.91004	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0682147	0.0113691	6	4.79	0.00178	Significant Effect
Error	0.0664790	0.0023743	28			
Total	0.13469368	0.0137434	34			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Water		6.25	27.5	16	> 0.0500	1	Non-Significant Effect
		12.5	27.5	16	> 0.0500	1	Non-Significant Effect
		25	27.5	16	> 0.0500	1	Non-Significant Effect
		50	27.5	16	> 0.0500	1	Non-Significant Effect
		75	27.5	16	> 0.0500	1	Non-Significant Effect
		100	20	16	> 0.0500	2	Non-Significant Effect

Data Summary

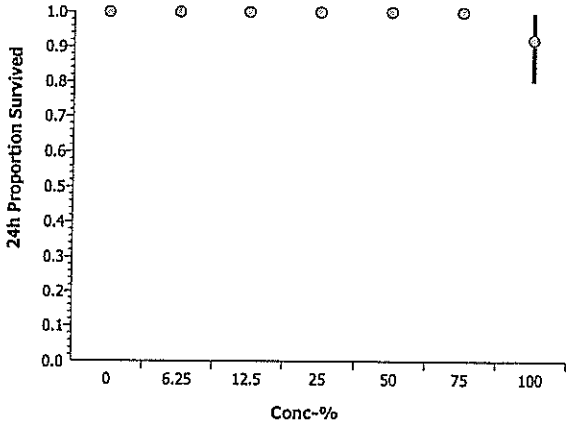
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	5	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00026
6.25		5	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00026
12.5		5	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00026
25		5	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00026
50		5	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00026
75		5	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00026
100		5	0.92000	0.80000	1.00000	0.08367	1.28585	1.10715	1.41202	0.12892

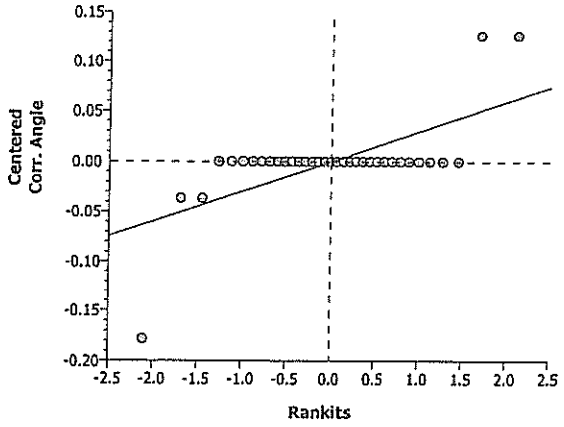
Data Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	1.00000	1.00000	1.00000	1.00000	1.00000					
6.25		1.00000	1.00000	1.00000	1.00000	1.00000					
12.5		1.00000	1.00000	1.00000	1.00000	1.00000					
25		1.00000	1.00000	1.00000	1.00000	1.00000					
50		1.00000	1.00000	1.00000	1.00000	1.00000					
75		1.00000	1.00000	1.00000	1.00000	1.00000					
100		1.00000	0.90000	1.00000	0.80000	0.90000					

CETIS Analysis Detail

Graphics





CETIS Analysis Detail

Americamysis 96-h Acute Survival Test — EnviroSystems, Inc.

Test No:	07-1088-3899	Test Type:	Survival (96h)	Duration:	94h
Start Date:	08 Mar-06 03:20 PM	Protocol:	EPA/821/R-02-012 (2002)	Species:	Americamysis bahia
Ending Date:	12 Mar-06 01:20 PM	Dil Water:	Natural Seawater	Source:	ARO - Aquatic Research Organisms, N
Setup Date:	08 Mar-06 03:20 PM	Brine:	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
72h Proportion Survived	Comparison	11-3381-8273	11-3381-8273	16 Mar-06 5:22 PM	CETISv1.026

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		25	50	4.00	35.355	6.62%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	1.15385	4.43069	0.36047	Equal Variances
Distribution	Shapiro-Wilk W	0.94255	0.88746	0.17907	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.59388	1.39847	4	292.53	0.00000	Significant Effect
Error	0.0956136	0.0047807	20			
Total	5.68949377	1.4032507	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Water		6.25	-1.4907	2.3	> 0.0500	0.10058	Non-Significant Effect
		12.5	-2.2361	2.3	> 0.0500	0.10058	Non-Significant Effect
		25	-1.4907	2.3	> 0.0500	0.10058	Non-Significant Effect
		50	25.6774	2.3	<= 0.0500	0.10058	Significant Effect

Data Summary

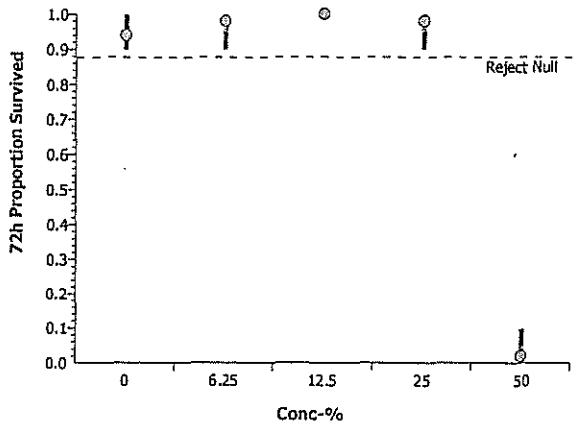
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	5	0.94000	0.90000	1.00000	0.05477	1.31423	1.24905	1.41202	0.08926
6.25		5	0.98000	0.90000	1.00000	0.04472	1.37942	1.24905	1.41202	0.07288
12.5		5	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00026
25		5	0.98000	0.90000	1.00000	0.04472	1.37942	1.24905	1.41202	0.07288
50		5	0.02000	0.00000	0.10000	0.04472	0.19137	0.15878	0.32175	0.07288

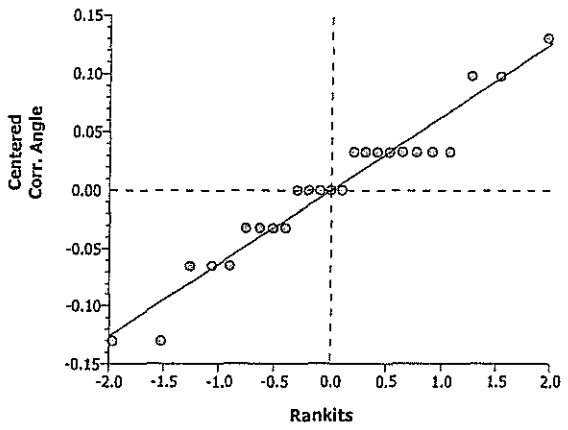
Data Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	0.90000	1.00000	0.90000	1.00000	0.90000					
6.25		0.90000	1.00000	1.00000	1.00000	1.00000					
12.5		1.00000	1.00000	1.00000	1.00000	1.00000					
25		1.00000	1.00000	1.00000	0.90000	1.00000					
50		0.10000	0.00000	0.00000	0.00000	0.00000					

CETIS Analysis Detail

Graphics





CETIS Analysis Detail

Report Date: 16 Mar-06 5:33 PM
Analysis: 04-6135-6263

Americamysis 96-h Acute Survival Test — **EnviroSystems, Inc.**

Test No:	07-1088-3899	Test Type:	Survival (96h)	Duration:	94h
Start Date:	08 Mar-06 03:20 PM	Protocol:	EPA/821/R-02-012 (2002)	Species:	Americamysis bahia
Ending Date:	12 Mar-06 01:20 PM	Dil Water:	Natural Seawater	Source:	ARO - Aquatic Research Organisms, N
Setup Date:	08 Mar-06 03:20 PM	Brine:	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
48h Proportion Survived	Trimmed Spearman-Karber	11-3381-8273	11-3381-8273	16 Mar-06 5:30 PM	CETISv1.026

Spearman-Karber Options

Threshold Option	Lower Threshold	Trim Level	Mu	Sigma
Control Threshold	0	0.67%	1.801124	0.01784305

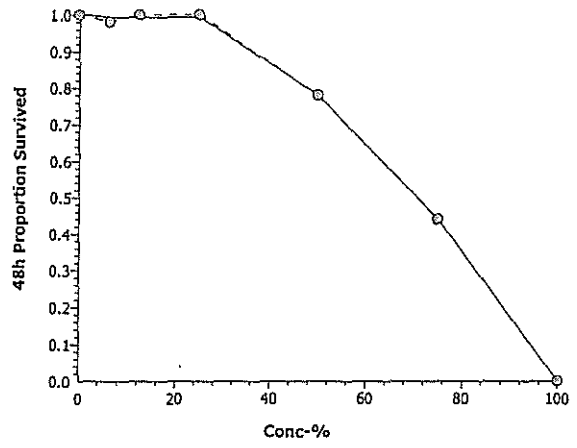
Point Estimates

EC50/LC50	95% LCL	95% UCL
63.25922	58.26902	68.67678

Data Summary

			Calculated Variate(A/B)						
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Water	5	1.00000	1.00000	1.00000	0.00000	0.00000	50	50
6.25		5	0.98000	0.90000	1.00000	0.00913	0.04472	49	50
12.5		5	1.00000	1.00000	1.00000	0.00000	0.00000	50	50
25		5	1.00000	1.00000	1.00000	0.00000	0.00000	50	50
50		5	0.78000	0.00000	1.00000	0.08944	0.43818	39	50
75		5	0.44000	0.00000	0.70000	0.06055	0.29665	22	50
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	50

Graphics



CETIS Analysis Detail

Americamysis 96-h Acute Survival Test — EnviroSystems, Inc.

Test No:	07-1088-3899	Test Type:	Survival (96h)	Duration:	94h
Start Date:	08 Mar-06 03:20 PM	Protocol:	EPA/821/R-02-012 (2002)	Species:	Americamysis bahia
Ending Date:	12 Mar-06 01:20 PM	Dil Water:	Natural Seawater	Source:	ARO - Aquatic Research Organisms, N
Setup Date:	08 Mar-06 03:20 PM	Brine:	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
72h Proportion Survived	Trimmed Spearman-Karber	11-3381-8273	11-3381-8273	16 Mar-06 5:29 PM	CETISv1.026

Spearman-Karber Options

Threshold Option	Lower Threshold	Trim Level	Mu	Sigma
Control Threshold	0.06	0.00%	1.553349	0.004782179

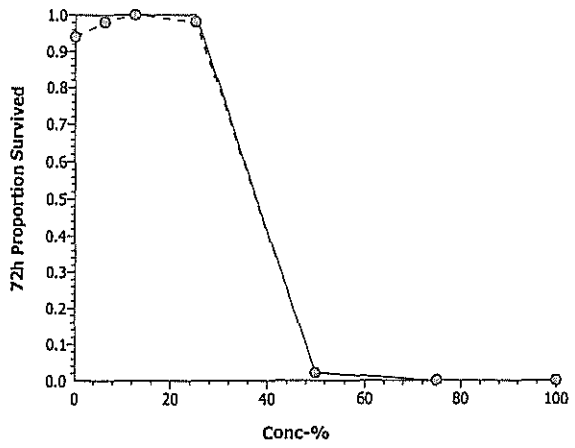
Point Estimates

EC50/LC50	95% LCL	95% UCL
35.75597	34.97713	36.55215

Data Summary

			Calculated Variate(A/B)						
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Water	5	0.94000	0.90000	1.00000	0.01118	0.05477	47	50
6.25		5	0.98000	0.90000	1.00000	0.00913	0.04472	49	50
12.5		5	1.00000	1.00000	1.00000	0.00000	0.00000	50	50
25		5	0.98000	0.90000	1.00000	0.00913	0.04472	49	50
50		5	0.02000	0.00000	0.10000	0.00913	0.04472	1	50
75		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	50
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	50

Graphics



CETIS Analysis Detail

Americamysis 96-h Acute Survival Test — EnviroSystems, Inc.

Test No:	07-1088-3899	Test Type:	Survival (96h)	Duration:	94h
Start Date:	08 Mar-06 03:20 PM	Protocol:	EPA/821/R-02-012 (2002)	Species:	Americamysis bahia
Ending Date:	12 Mar-06 01:20 PM	Dil Water:	Natural Seawater	Source:	ARO - Aquatic Research Organisms, N
Setup Date:	08 Mar-06 03:20 PM	Brine:	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Trimmed Spearman-Karber	11-3381-8273	11-3381-8273	16 Mar-06 5:27 PM	CETISv1.026

Spearman-Karber Options

Threshold Option	Lower Threshold	Trim Level	Mu	Sigma
Control Threshold	0.08	0.00%	1.551438	0.006081175

Point Estimates

EC50/LC50	95% LCL	95% UCL
35.59903	34.61591	36.61006

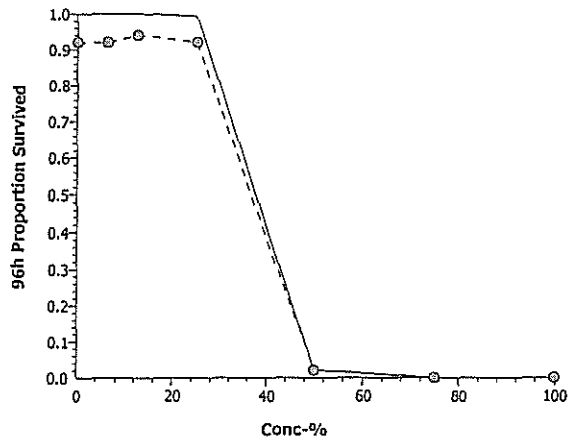
Test Acceptability

Attribute	Statistic	Acceptable Range	Decision
Control Response	0.92	0.9 - N/A	Passes acceptability criteria

Data Summary

			Calculated Variate(A/B)						
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Water	5	0.92000	0.80000	1.00000	0.01708	0.08367	46	50
6.25		5	0.92000	0.80000	1.00000	0.02236	0.10954	46	50
12.5		5	0.94000	0.80000	1.00000	0.01826	0.08944	47	50
25		5	0.92000	0.70000	1.00000	0.02661	0.13038	46	50
50		5	0.02000	0.00000	0.10000	0.00913	0.04472	1	50
75		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	50
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	50

Graphics



Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: AMERICAMYSIS BAHIA

Source: Lab reared ✓ Hatchery reared _____ Field collected _____

Hatch date 3-3-06 Receipt date _____

Lot number 030306 MS Strain _____

Brood Origination FLORIDA

II. Water Quality

Temperature 25 °C Salinity ~30 ppt DO —

pH 7.8 Hardness — ppm

III. Culture Conditions

System: RECIRC

Diet: Flake Food ✓ Phytoplankton _____ Trout Chow ✓

Brine Shrimp ✓ Rotifers _____ Other Excap. Shrimp Diet

Prophylactic Treatments: _____

Comments: _____

_____

IV. Shipping Information

Client: ESI # of Organisms: 350+

Carrier: _____ Date Shipped: 3-7-06

Biologist: Mark Rosengrant

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

EFFLUENT & DILUENT CHEMISTRY and WATER QUALITY DATA

PARAMETER	100% Effluent	50% Effluent	Diluent - Lab Salt
TRC	<0.05		<0.05
As Received - pH (SU) @ 20°C	6.46		7.87
As Received - Salinity (ppt)	11.4		25
As Received - Dissolved Oxygen (mg/L)‡	1.3		7.3
As Received - Ammonia (pull)	-002		-005
Salinity Adjusted - pH (SU) @ 20°C	7.07	(3) 7.27 7.22	
Salinity Adjusted - Salinity (ppt)	24	25	
After Aeration - Dissolved Oxygen (mg/L)	3.6	(48) ~~5.8~~ 5.8	
Salinity Adjusted - Ammonia (pull)		-003	
48 hour Ammonia (pull)			
48 hour pH (SU) @ 20°C		7.27	7.95

- Aerate prior to mixing concentrations.

PREPARATION OF DILUTIONS

STUDY: 14326 | CLIENT: CH2M HILL - American Samoa

SPECIES: *A. bahia*

Diluent: Lab Salt	Day: 0 Sample: EOA		Day: 2 Sample:	
Concentration	Vol. Eff.	Final Vol	Vol. Eff.	Final Vol
LAB	0	1000	0	~~1000~~ 800
6.25%	62.5		50	
12.5%	125		100	
25%	250		200	
50%	500		400	
75%	750		600	
100%	1000		800	

HRS	Date	Time	Initials
0	3/8/06	1430	SJ
48	3-10-06	1430	AF

Comments:

RECORD OF METERS USED FOR WATER QUALITY MEASUREMENTS

STUDY: 14326	CLIENT: CH2M HILL - American Samoa					
WATER QUALITIES - A. bahia						
HOURS:	0	24	48 - old	48 - new	72	96
Water Quality Station #	1	2	1	1		
Initials	SJ	ZM	AF	AF		
Date	3/8/06	3/9/06	3-10-06 →			

Water Quality Station #1		Water Quality Station #2		COMMENTS
DO meter #	18	DO meter #	19	
DO probe #	12	DO probe #	11	
pH meter #	1097	pH meter #	470	
pH probe #	44	pH probe #	45	
S/C meter #	YSI 30B	S/C meter #	YSI 30B	
S/C probe #	↓	S/C probe #	↓	
Salinity meter #	↓	Salinity meter #	↓	

STUDY: 14309
CLIENT: CH2MHill - American Samoa
PROJECT: Wastewater Treatment Plant
TASK: Unionized Ammonia Calculations

Day / Date	Treatment	Temperature Deg C	Sample pH SU	NH_3 mg/L	Unionized NH_3 mg/L
Day 0	Lab Diluent	20	7.87	0.1	0.003
	50% Effluent	20	7.22	13.0	0.085
	100% Effluent	20	6.46	23.4	0.027

Report No: 14309
Project: American Samoa
SDG:

Sample ID: 14309-005 ESIN1 LAB SALT 25 ppt
Matrix: Water
Sampled: 03/08/06

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	Method/Reference
Ammonia-N	14309-005	ND	0.1	mg/L as N	03/10/06	03/10/06	SM 4500-NH3 G

Notes:

ND = Not Detected

EnviroSystems, Inc. P.O. Box 778 Hampton, NH 03842-0778 603-926-3345 fax 603-926-3521 www.envirosystems.com

Report No: 14326 SDG:
Project: American Samoa

Sample ID: EFFLUENT 100%
Matrix: Water
Sampled: 03/08/06

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	Method/Reference
Ammonia-N	14326-002	23.4	0.1	mg/L as N	03/27/06	03/27/06	SM 4500-NH3 G

Notes:

Report No: 14326
Project: American Samoa

SDG:

Sample ID: EFFLUENT 50%
Matrix: Water
Sampled: 03/08/06

Parameter		Result	Quant Limit	Units	Date Prepared	Date of Analysis	Method/Reference
Ammonia-N	14326-003	13	0.1	mg/L as N	03/10/06	03/10/06	SM 4500-NH3 G

Notes:

ESI

EnviroSystems, Inc.
One Lafayette Road
P.O. Box 778
Hampton, N.H. 03843-0778
(603) 926-3345 · (603) 926-3521 Fax
www.envirosystems.com

SAMPLE RECEIPT RECORD
FOR CHRONIC TOXICITY EVALUATIONS

STUDY #: 14326 | CLIENT: American Samoa

SAMPLE RECEIPT INFORMATION

	Start Sample	First Renewal	Second Renewal	Third Renewal
Sample Receipt Date & Time:	3/8/06 1240			
Received By:	SJ			
Delivered Via:	Fed Ex UPS Client Courier DHL ESI	Fed Ex UPS Client Courier ESI	Fed Ex UPS Client Courier ESI	Fed Ex UPS Client Courier ESI
Logged Into Lab By:	SJ			
Date &Time Logged In:	3/8/06 1240			

SAMPLE CONDITION INFORMATION

Chain of Custody?	(Yes) or No	Yes or No	Yes or No	Yes or No
Chain of Custody Signed?	(Yes) or No	Yes or No	Yes or No	Yes or No
Chain of Custody Complete?	(Yes) or No	Yes or No	Yes or No	Yes or No
Sample Date?	(Yes) or No	Yes or No	Yes or No	Yes or No
Sample Time?	(Yes) or No	Yes or No	Yes or No	Yes or No
Sample Type?	(Yes) or No	Yes or No	Yes or No	Yes or No
Custody Seal in Place?	(Yes) or No	Yes or No	Yes or No	Yes or No
Shipping Container Intact?	(Yes) or No	Yes or No	Yes or No	Yes or No
Temp Blank Temperature:	0°C			
DOES CLIENT NEED NOTIFICATION OF TEMP?	Yes or (No)	Yes or No	Yes or No	Yes or No
Sample Arrived on Ice?	(Yes) or No	Yes or No	Yes or No	Yes or No
COMMENTS:	1x5g Eff			

NPDES\FORMS\Lab\forms\Chem&LabLogBooks\ChronicReceipt.FRM

14326

CH2M HILL
APPLIED SCIENCES LABORATORY

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

CH2M Hill Project # 147323.JC.06.NT	Purchase Order #
Project Name: JOINT CANNERY OUTFALL	
Company Name/CH2M HILL Office: CH2M HILL	
Project Manager & Phone # Mr. [X] Ms. [ ] STEVE COSTA Dr. [ ]	Report Copy to: SAME 707-677-0123
Requested Completion Date:	Sampling Requirements: SDWA [ ] NPDES [X] RCRA [ ] OTHER ___
Sample Disposal: Dispose [X] Return [ ]	

LAB TEST CODES

SHADED AREA - FOR LAB USE ONLY: Lab 1 #; Lab 2 #; Quote #; Kit Request #; Project #; No. of Samples; Page ___ of ___; Login; LIMS Ver; REMARKS; LAB 1 ID; LAB 2 ID

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	Matrix AIR	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	96 HR STATIC BIOASSAY WITH MYSID	REMARKS	LAB 1 ID	LAB 2 ID
2/28-3/1/06		X		X			Ø6NNT	1	X	*		

Sampled By & Title (Please sign and print name) S. Costa	Date/Time 3/1/2006	Relinquished By (Please sign and print name) S. Costa	Date/Time 3/2/2006	QC Level: 1 2 3 Other: ___	
Received By (Please sign and print name) Shelli Jackman	Date/Time 3/8/06	Relinquished By (Please sign and print name)	Date/Time	COC Rec	ICE
Received By (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time	Ana Req	TEMP
Received By (Please sign and print name)	Date/Time	Shipped Via UPS BUS Fed-Ex Hand Other DHL	Shipping # 782-0788-485	Cust Seal	Ph
Work Authorized By (Please sign and print name)	Remarks * DILUTIONS @ 100, 75, 50, 25, 12.5, 6.25 % EFFLUENT				

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client

REV 3/94 FORM 340